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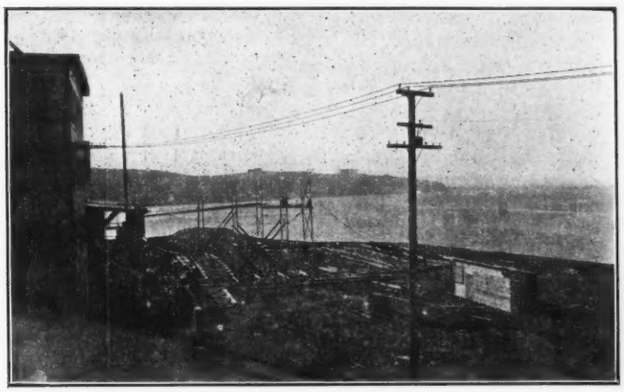
VOLUME XVI SAN FRANCISCO, CAL., JUNE 16, 1906 No. 11

The Reinforced Concrete Bag House of the Selby Smelting and Lead Co.

BY JAMES C. BENNETT

In view of the rather unusual conditions to be satisfied in the building of the "Bag House" at the plant of the Selby Smelting and Lead Company, some space may be profitably devoted to the explanation of the service to which the building is to be applied, and to the various plans that were considered before finally deciding on the present plans and materials.

At the time of writing the building is but nearing completion, so that its ultimate suitability yet remains to be



LOCATION OF BAG HOUSE.

proven. Structurally, there is no question as to its qualifications, hence the present is doubtless as good time—and in view of the recent experience to which San Francisco has been subjected, probably an especially opportune one—to publish the data concerning the construction.

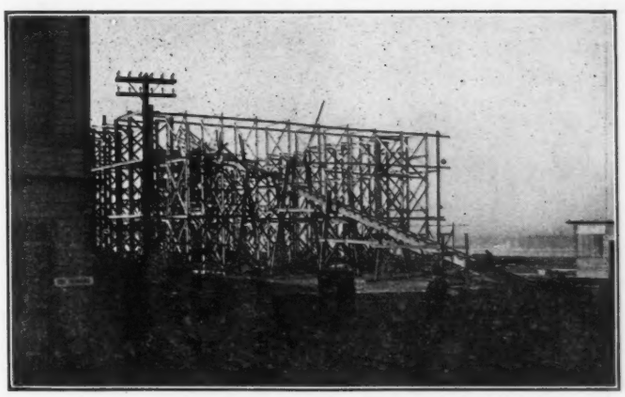
To start with the beginning of the plans, the threatened law suits against the smelting company necessitated some action looking to the abatement or alleviation of the "smoke nuisance," as the agriculturists and towns people of the lower part of the Sacramento valley claim that the smoke issuing from the chimneys of the smelting plant is injurious to animal and vegetable life, and have taken steps looking toward the recovery of damages therefor. As it is not the purpose of this articles to enter into a discussion of the pros and cons of the subject of damages, suffice it to say that the smelting company considered it advisable to provide a means of filtering the gases which are produced by the blast furnaces. The method adopted is neither new or experimental, whereupon the form of the necessary structure and the materials of which it should be built at once became the leading questions for solution

Taking this opportunity to digress somewhat—the process of filtering waste furnace gases involves sufficient length or surface of flue to cool the gases to a temperature at which they can be safely passed through a filter composed of many muslin bags or tubes, and the subsequent returning of the filtered gases to a point where they may be discharged into the atmosphere and become diffused and diluted to such an extent as to become both harmless and non-obnoxious.

Now to return to the immediate subject of our consideration; the building must provide, primarily, a chamber to contain the filtered surface, and also a chamber in which the filtrate may be collected and subsequently burned for the purpose of reducing the flour like dust to a cindered mass which will admit of handling. As to the material of construction, it must be understood that the gases from blast furnaces are laden with various chemical elements and compounds which are destructive to most building materials, and particularly so to brick and concrete. Among these destructive constituents of the gases, probably the most active is sulphurous acid which tends to unite with mortars and cements causing rapid disntegration. Another requisite of this building is that it be air-tight, or practically so, as the gases are exhausted therefrom through the medium of chimney drafts.

Having thus briefly outlined the general conditions to be met let us proceed to the local conditions and requirements of building. The first consideration is that of the liabiilty of this section of the country to occasional seismic disturbance. The recent events of this nature have unquestionably demonstrated the wisdom of taking into account the possibility of such occurrences, and have as plainly shown the suitability of the materal which was finally decided upon. This point, however, will be dwelt upon more fully in its place.

The ground upon which it was decided to erect the building is entirely "filled"—very solid on the surface but of uncertain nature beneath. The smelting plant is located at the mouth of Carquinez Straits, and where they open out into San Pablo Bay, leaving a "cove" to one side of the main current where much of the silt brought down by the



BRACING AND MACHINE SETTING.

Sacramento and San Joaquin Rivers is deposited, forming a shifting mud of very uncertain depth. It is assumed that this depth will range from ten to twenty feet, but it is very difficult to ascertain the exact final depth, as conditions change as the filling progresses. The material which is used for filling is composed entirely of the gangue or slag from the blast furnaces, and is deposited in a molten condition.

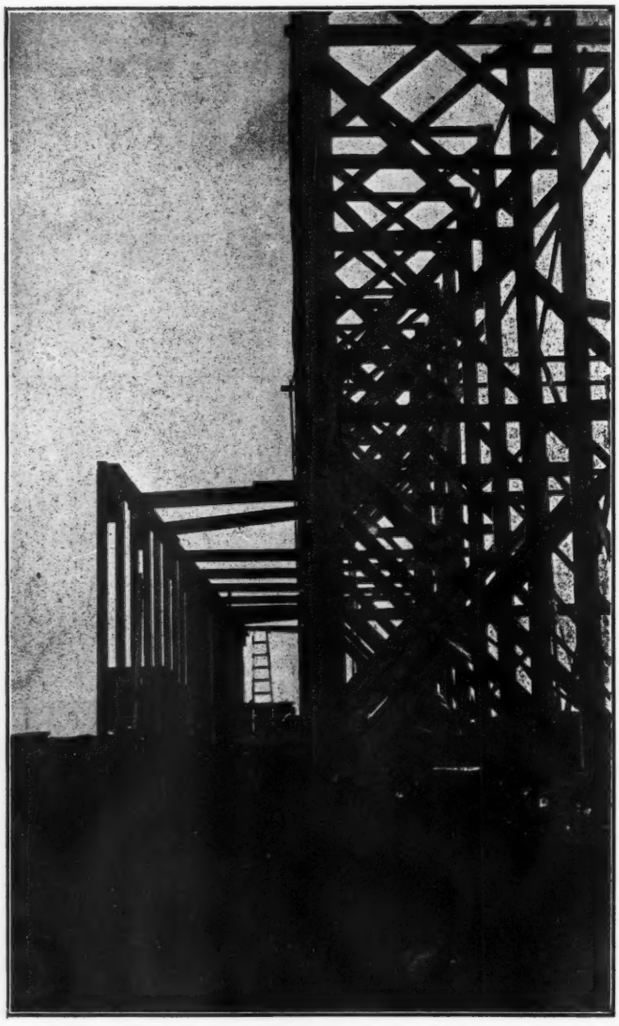
The fact of the natural surface being covered with water introduces a further complication since the molten slag, on striking the water becomes broken up into small porous

pebbles, which, if left undisturbed, may be of considerable size, but when subjected to pressure between solids become quite finely divided, resembling a very coarse sand or a very fine gravel. So long as the slag is poured into the water it is affected in this manner, but as the fill rises above the level of low tide there occur alternate strata of solid slag and granulated slag, corresponding to the height of the tide. After rising above high tide level, the entire fill is made up of many strata of solid slag, varying in thickness from one-half to three-quarters of an inch, and lying on a slope of from ten to twenty degrees from the horizontal.

Unfortunately, the mixture of mud and granulated slag cannot be depended upon to remain where the latter is deposited, for as the weight of the fill gradually increases, this weight, together with the action of the tides, causes the mixture to occasionally move toward deep water, thus producing cracks in the surface of the fill which indicate a fall of its (the fill) outer edge rather than a uniform settling of the entire mass.

In selecting a site for the proposed building, it was found necessary to make the ground on which it should be erected. Consequently the location placed the building quite close to the top of the bank, and here, it will be seen, was introduced the necessity of providing for uneven settling as the ground thus made has been known to continue its shif ing for two years or even more.

There are a number of these "Bag Houses" in use in the various sections of the country, and, so far as the writer is aware, without exception they are constructed of brick, with steel roof trusses in some and wood in a few. Thus it was not unnatural that brick should be the first material thought of in the contemplation of this building. At the time the possibiilties of earthquake was not nearly so strong an argument against the use of brick construction as it would be in such a project if considered at this time. The principal argument against brick was the uncertain and unsettled condition of the ground It was realized that brickwork could not successfully withstand any amount of uneven settling without great danger of developing serious fractures, and furthermore the effect of the gases on brickwork must not be lost sight of.



FORM BRACING.

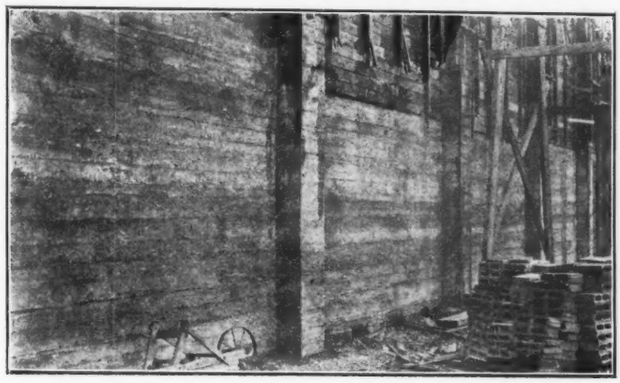
After much discussion and consideration, permission was granted the engineering department to draw up plans for a building composed of structural steel skeleton and reinforced concrete curtain walls and fireproofing, but it was still required that alternative tenders should be sought for a brick building with steel roof construction. The designing then proceeded on these lines until the size of the columns and the dimensions of their fireproofing was determined. Then another and successful effort was made to still further eliminate the use of the structural shapes by taking advantage of the compressive strength of the fire proofing for the columns, thus eliminating the steel columns and substituting the requisite amount of steel as reinforcement for the concrete pilaster, in the form of bars. The principal argument used was that when the necessary amount of concrete was placed about the steel columns for fireproofing purpose, it was found that the compressive strength of the concrete was sufficient for the load to be imposed, which meant that there was a great surplus of material, either in steel or concrete, and by placing the steel in the two faces of the columns in the form of reinforcing bars, the area of the steel was lessened considerably. The cost per pound of steel was lessened also, thus effecting a very great reduction in the cost of the materials.

The question of concrete roof and roof support was considered but the roof support of this material could not be used without carrying the building considerably higher, as it is necessary to provide passage way through the roof trusses which is scarcely permissable in concrete beam work. Considerable effort was made , however, to use a concrete roof, but without avail, as the engineering department seemed to have exhausted its powers of persuasion in reaching the concrete pilasters and wall construction.

The recent seismic disturbances have unquestionably demonstrated the suitability of the reinforced concrete as a building material for this section of the country, as is evidenced by the manner in which this building "weathered the storm." At the close of work on April 17th, the walls had attained a height of about forty-two feet above the ground and were entirely without exterior support. On the inside they were supported only by the temporary wind bracing, there being still some eight feet to the final height. Some three or four hours after the earthquake, the author carefully examined the condition of the ground and of the building and found that the ground was considerably cracked on the shore side of the building. There were no large cracks, and no apparent settling, the ground having been evidently forced upward sufficiently to overcome its tensile strength and then restored to its original position. The building showed no evidence whatever of any ill effects —the tile lining on the lower part of the walls was absolutely intact, as adjudged by tapping a number of the tiles on various parts of the walls. When examined by means of the level, there could be found no indication of any settlement, although a few days later, when again tested with the level, a settlement of about one inch was found on one corner. There were no cracks whatever in any part of the building; the author was told, however, by one of the workmen that there was a very small horizontal crack running a long near the top of one wall of the flue which is

built against the shoreside of the building and is a part of the monolithic mass forming the main building. On later examination this crack could not be found by the writer, but, granting that it did exist, he is inclined to attribute its presence to a natural settling of the ground, and that it may easily have existed before the time of the earthquake. It certainly was of no importance structurally, as it could not possibly be more than a surface crack and could not extend deeper into the concrete than to the reinforcing bars.

It seems scarcely necessary to more than call attention to the probable effect on the structure had it been of brick, as was at first contemplated, for with the "green" condition in which the work must necessarily have been, there



THE OUTSIDE WALL.

could have been but one result—the practically complete demolition of the entire work, for aside from the isolated chimneys on the plant, there was scarcely a chimney left standing intact, although it is a curious incident that throughout the fifteen hundred or two thousand feet of brick flue, but one crack was discovered. This excellent result may be attributed probably to the quality of the work, as it was built entirely by day work, and under the supervision of a foreman who takes a remarkable pride in the characteer of his work.

Having thus covered the general conditions governing the building, its materials and their quality, the remainder of the paper will be devoted to the details of the building and of the flues which connect it with the present system.

[To be Continued.]

NEW GENERAL ELETRIC OFFICES IN SAN FRANCISCO

The General Electric Company, which established its main office in the Union Savings Bank Building at Oakland, Cal., immediately after the San Francisco disaster, as well as a local office at 1759 Geary street, San Francisco, has leased a suite of rooms in the new Monadnock Building, San Francisco, which they expect to occupy about June 15, 1906. For handling the present business, a half block of land has been leased in Emeryville in close proximity to both the Santa Fe and Southern Pacific Railroad tracks. A temporary building is now about completed on this land for taking care of stock, and work has already been started on a new warehouse containing about 80,000 square feet, which will be located at the south end of the block, bounded by Kansas, Rhode Island, Fifteenth and Alameda streets. At the temporary warehouse, forty cars of material have been housed and nineteen cars of additional apparatus is now in the yards waiting to be unloaded, with thirty or forty more cars en route from Schenectady. Additional cars are being shipped from the company's factories so that the stock at San Francisco will soon be complete. At present the company is in excellent condition to fill orders as rapidly as before the fire.

WASHINGTON PORTLAND CEMENT COMPANY

The Washington Portland Cement Company's new plant, located in Skagit county, Washington, on the Skagit branch of the Great Northern Railway, between Anacortes and Rockport, about 104 miles northwest of Seattle, which was begun early last spring, is expected to be ready for operation August 1, 1906. The equipment, both for power and cement making, is, in many respects, worthy of note, being furnished by a single concern, the Allis-Chalmers Company, of Milwaukee, whose hydraulic turbine will furnish power to operate an Allis-Chalmers generator, which in turn will supply current for a full equipment of Allis-Chalmer motors, mounted directly on the various machines used in the modern process of Portland cement manufacture, which are also furnished by the Allis-Chalmers Company.

It is the intention of the building company to bring the capacity of the plant up to the capcaity of 3,000 barrels per day by adding two kilns at a time. The initial installation will consist of a complete machinery equipment for a two-kiln plant, using the dry process by means of water power and electrical drive. The raw material to be used consists of limestone and shale, the former located in deposits 1,500 feet from the plant and the latter 500 feet, both connected by an electric road over which the material will be transported. The water power, which is capable of developing 3,000 horse-power, will operate a 1,150-horsepower Allis-Chalmers twin turbine with centre disks and cantilever type bearings from a fall of fifty feet. The discharge will be 250 feet per second and the speed 360 revolutions per minute.

Each principal machine, such as the crusher, disintegrator, dryer, ball mills, tube mills, etc., will be driven by direct mounted individual Allis-Chalmers motors. The auxiliary machinery, such as the elevators, conveyors and feeders, will be driven in groups by Allis-Chalmers motors. As far as possible the object has been to avoid the use of shafting, belts and pulleys.

Motors of twenty horsepower or over are Allis-Chalmers type "H", not enclosed, and the smaller motors are type "B" and enclosed. The electrical equipment will be very complete. The generator direct-connected to the turbine will be a 750 kilowatt Allis-Chalmers, water wheel type alternator, three-phase, sixty cycles, 600 volts, excited from a direct coupled exciter of twenty kilowatts capacity. There will be thirty four induction motors installed, in capacity from one and one-half 100 horse power and aggregating 870 horsepower. In addition to the interior equipment for the mill, an electric locomotive will operate between the mills and the shale and limestone deposits. The locomotive will haul sixteen one and one-half yard cars and be capable of a speed of six miles per hour. The company intends to erect lime kilns for the production of lime for the Seattle market.

N. L. Warford, late of the Standard Portland Cement Works, of Napa Junction, Cal., is superintendent of the plant. The following persons are officers of the company: A. W. Middleton, president; A. S. Austin, vice president; S. M. Anderson, treasurer; E. E. Caine, secretary and E. C. Miller, general manager. One hundred men are employed at the present time on the construction of the plant.

MUNICE, IND., DECIDES THAT MUNICIPAL OWNERSHIP IS A FAILURE.

Muncie has decided that municipal ownership as applied to street lighting is a failure. The officials, it is said, came to this decision several years ago, but sentiment prevented them from making any change until now. The municipal plant was recently wrecked by the explosion of a large flywheel, and it now now the purpose to let a contract to a private corporation to light the city. The city plant will be abandoned, it is said.

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EDITORIAL

Highest Efficiency.

Two requirements are universally recognized as necessary in the design, construction and operation of very successful power installations, no matter for what purpose the power is to be used, or the character or type of the installation. One refers to the individual machines or units of the plant, the other to the system as a whole.

Considering, first, the unit machine. In order to fully meet the conditions, in practically every case, desirable or even necessary, each piece of apparatus and its accessories must be capable of carrying excessive over loads for brief periods of time. Not that such excessive demands above the normal is coincident with the highest efficiency of each unit, but as a rule the capacity to carry such peak loads results in the highest gross or commercial efficiency for the entire system when considered for any given period of operation.

Every operator, superintendent, manager and even director of a power company appreciates the great value of a machine which can always be depended upon to do more than its normal work when adverse conditions are to be met. Most any old device will do under normal or ordinary occasions, but when everything goes wrong and the unexpected happens, the best machinery is not only desirable but absolutely necessary.

The second requirement is the duplication of machinery or provision of a "spare" in case of an emergency. In any single plant this means extra machines or units not ordinarily needed; in a large system it may necessitate duplicate or "spare" plants complete, which are held in reserve ready for use at any moment. Local conditions may render one station or portion of the system inoperative, in which case the other stations are immediately called upon to meet the emergency, and the system suffers no appreciable inconvenience, although one of its centers of power has been temporarily rendered useless.

And yet the most perfect system, consisting of many separate sources of power or stations, each equipped with machinery designed and constructed to operate under abnormal loads, would fail if there is lacking the intelligent, skillful and eternally vigilant supervision, which can only come from the brain and hand of man, and the man must not only have the requisite ability, but he must also have that spirit which causes him to make the utmost endeavor, no matter what adverse conditions are to be overcome.

California, we are sure, has been since the early days an important center in the great system of commercial, intellectual and material development and activity of the Pacific Coast. Yes, even of the entire country. San Francisco has been one of the greatest central stations of human energy of the State, but, as in the case of the large power system, San Francisco is only one of such centers, and in the same way Californfa is but one in the United States.

Although we recently suffered one of the greatest "burn-outs" on record, yet temporary repairs are rapidly being made and even now we are beginning to feel that we are again a part of the great system as it existed before the catastrophe. The emergency has come, and it is necessary that we all carry a heavy "peak load" until normal conditions are restored. The mediocre man, with little resourcefulness, can well be spared and transferred to some other station of activity, where nothing out of the ordinary can be expected of him, but the individual who is so situated as to give his best efforts even under abnormal conditions, can find no better field of activity than in San Francisco.

Nor are we forgetful of the fact that practically every other central station of the great energy system of the country most loyally helped us with our burden at the time of our "break down." The Pacific Northwest, Southern California and the Rocky Mountain West, yes from Vancouver to the city of Mexico, and from Butte to Denver, all helped to carry our load, as if it were their only work to do. The same is true of the entire country, North, East and South, and we hope that we will succeed in making them understand how we appreciate their most effective efforts in our behalf.

And, finally, no matter what may be the loss or destruction of property, consisting of the great machinery of a great city, of its buildings, and all that goes to make up the material side of a metropolis, the men with the proper spirit remain, and they will be supreme under any conditions.

Back Numbers of "The Journal."

If you have any and can spare same we would request that you forward them to our office, Atlas Building, 606 Mission Street, San Francisco. We have constant need of back issues of THE JOURNAL, and as our reserve copies (including our bound volumes) were entirely destroyed by the fire, we must depend upon the kindness of our friends in replacing same.

PERSONAL.

Mr. C. H. Pennoyer, Pacific Coast Manager of the National Conduit and Cable Company, announces that he will shortly remove to offices in the Monadnock Building, San Francisco.

Trade Catalogues.

Allis-Chalmers Publications—

"Crushing Rolls." This bulletin, No. 1412, gives details of Allis-Chalmers' standard line of crushing rolls, which comprises the Gates high grade roll, the Fraser & Chalmers standard roll, and Fraser & Chalmers old style belt roll. Illustrations and descriptions are given of these rolls; also tables of regular and special sizes. Descriptions of their auxiliary line of crushing rolls, including the Blake ore crusher, the Dodge crusher and Gates rock and ore breaker.

"Conveying Machinery," Bulletin No. 1707. This bulletin gives particulars of forged sawdust chains, Heald's malleable sawdust chains, automatic sawdust or fuel feeder, burner conveyors and expansion sprockets, together with tables of dimensions and list of sizes.

Stanley G.-I. Electric Manufacturing Company, Bulletin No. 603—"Carbon Circuit Breakers," Types C-16, C-7, C-11. The Type C-16 breaker is made in all capacities from fifteen to twelve hundred amperes, inclusive; The Type C-7 breaker from three to three hundred amperes, inclusive, and the Type C-11 breaker from two thousand to ten thousand amperes. Full price list is included.

American Vulcanized Fibre Company, Wilmington, Delaware. Catalogue and price list of hard vulcanized fibre sheets, square sticks, rods, tubings, washers, discs, valves, staples, spur gears, gear blanks, roving cans, taper baskets and boxes.

Sprague Electric Company, New York City. Book of instructions for proper conduit installations. This is a valuable pamphlet for engineers and contractors and others engaged in construction work. In addition to the practical descriptions of the various styles of conduit, the National Board of Underwriters' table of "Carrying Capacity of Wires" is given; also a table of decimal equivalents; a classification of the properties of various substances and other tables and formulas of considerable value.

The "Sibley Journal of Engineering," Cornell University, May, 1906. Besides other interesting matter, contributions are published as follows: "Manufacturing Interchangeable Machine Parts," by John H. Barr; "Current Practice in Petrol Engine Design," by G. W. Rice; and "Discovery and Invention," by E. G. Acheson.

Advance Papers, Volume XXVII, No. 24, American Society of Mechanical Engineers, presented at the meeting at Chattanooga, Tennessee, May 1st to 4th, 1906. The contents are as follows: By Mark A. Replogle, "Some Stepping Stones in the Development of a Modern Water Wheel Governor;" Geo. J. Henry, Jr., "Regulation of High Pressure Water Wheels for Power Transmission Plants"; John Sturgess, "Speed Regulation of Water Power Plants"; Geo. A. Buvinger, "Turbine Design as Modified for Close Regulation;" Wm. O. Webber, "Efficiency Test of Turbine Water Wheels;" Wm. H. Bristol, "Low Resistance Thermo Electric Pyrometer and Compensator;" James M. Dodge, "History of the Introduction of a System of Shop Management;" "Report of Committee on Standard Proportions for Machine Screws."

Proceedings of the American Institute of Electrical Engineers, May, 1906. This gives the minutes of their annual meeting, results of annual election of officers, result of vote for revised constitution; also various papers and discussions.

WAGNER ELECTRIC MFG. CO.

The Wagner Electric Manufacturing Company, of St. Louis, has appointed the Hendrie and Bolthoff Manufacturing and Supply Company, 1621 Seventeeth Street Denver, as their Colorado agents. Hendrie and Bolthoff have been well and favorably known to the trade for a great many years and have a large force of salesmen and travelling men, who will make a special effort to increase the sales of the Wagner product in the Denver territory.

ENGINEERING WORK IN THE PHILIPPINES.

Sixty-seven members of the Engineers and Architects' Association gathered at the regular monthly dinner meeting at Levy's cafe, Los Angeles to listen to the address on American and Spanish engineering in the Philippines delivered by Capt. Amos A. Fries. The latter was prominently connected with engineering work in the Philippines islands shortly after the Spanish-American war.

In his address Capt. Fries referred to the durability of the molave wood when used as piles. Capt. Fries said that in the Philippines the piles made from that wood lasted almost indefinitely and resisted the action of insects and water to a marked degree.

The unfortunate feature of this excellent wood is, however, that it will probably prove too expensive, as it costs $2 a foot. Another feature is that it will not float, and would for that reason be hard to get here owing to the excessive cost of transportation. Still another feature is that it comes in lengths that will possibly be too short for some harbors.

STREET LIGHTING IN LOS ANGELES.*

The method adopted at Los Angeles was first installed by property owners on Broadway, but was later turned over to the city. It consists of ornamental posts placed an average of 100 feet apart, each post being directly opposite one on the other side of the street. The lights are placed upright, which, while not so efficient as if they had been placed in a pendant position, renders the liability to breakage less and protects the passers-by from falling pieces of glass. The post is a cast-iron column having three cross-arms. In the center is placed a ball of ground glass, rough on the inside and eighteen inches in diameter, which contains six thirty-two-candle-power lamps in two tiers. Surrounding this are six eight-inch balls on the arms, each containing one thirty-two-candle-power lamp. All lamps burn from dark until midnight, after which hour the lamps on two of the four posts at corners of the street are turned off. The voltage employed is 110. The posts cost $110 each, and there are in all 134, covering a distance of ten blocks. Some trouble at first, due to heating of the rubber insulation on the wire, has been overcome by substituting an asbestos covering.

The system of illumination, which was installed at the cost of the property owners, was turned over to the city as a gift, with the understanding that it pay for the current and that the lighting company furnish lamp renewals and globes. The satisfactory lighting which resulted has led to the extension of this plan, and a state law has been passed authorizing the city council to assess property on any street owners in order to install the system, provided two-thirds are in favor of the undertaking. Two or three other streets have already adopted the new system, with the slight change in the type of post. That on Spring street has but four arms, with twelve inch rough glass balls containing three sixteen-candle-power lamps in each. The centre ball is sixteen inches in diameter and contains six thirty-two-candle-power lamps.

Photographs of the streets at night show apparently a satisfactory illumination. It is said that a newspaper can be read easily at any point of the street. The objections to the system are loss of light which is thrown upward, and the cost. Efforts are being made to overcome the first difficulty.

A number of other California towns, notably Pasadena, have adopted the new system. At the latter place the posts have four arms and the balls are placed in a pendant position, with a large upright globe in the centre. These, it is said, give a better illumination, though they are not as ornamental as the others.

At Los Angeles the consumption of current is practically twelve amperes at 100 volts per post, which is the equivalent of one six-ampere arc lamp every twenty-five feet.

* Extract from paper by Messrs. W. Underwood and V. R. Lansingh, read before the Illuminating Engineering Society.

ELECTRICAL AND MECHANICAL EQUIPMENT OF THE NEW ENGINEERS' CLUB BUILDING.

The new club house now being built in West Fortieth Street, New York City, and which is to be the home of the Engineers' Club of that city, will be provided, says the Electrical World, with an electrical and mechanical installation well in keeping with the commodious and luxurious accommodations which the architect's designs will provide for the members. It embodies, moreover, a number of ideas which have not been tried to any considerable extent in buildings of a similar character, but which, it was concluded, would produce good results in this case.

In the sub-basement the machinery for the operation of the lighting, heating and refrigerating plant and elevator equipments, and also a portion of the ventilating machinery will be installed.

There will be two water tube boilers set in battery, each having approximately 200 horsepower capacity. These will be located in the rear end of the sub-basement. A coal storage room adjoining the boiler room has been provided and in addition an even larger room has been provided in the front of the building for the storage of coal in quantity.

The boilers are connected by a steel plate flue and breechings with the steel smoke stack which passes up the rear of the building. The smoke connections will be provided with a hand damper at each up-take from the boilers. In addition there will also be a balanced swinging damper in the main connection. This will be operated by shafting controlled by a Locke automatic damper regulator. Each boiler will be equipped with an injector for feeding. The power and exhaust piping will be briefly as follows: Branch connections will extend from the steam drums of each boiler to a main high-pressure line and from the latter there will run a main line to the engine room connecting with the high-pressure distributing header for the engines. There are separate high-pressure branch connections going to each engine with long sweep bends instead of fittings.

A branch main will be run from the high-pressure line near the boilers and will connect with all the steam pumps, the moistening apparatus, the kitchen, and laundry service, the hot water tanks, refrigerating apparatus, heating apparatus, air compressors, sewage ejectors, vacuum system exhauster, reducing valves, etc. All individual power branches are run from the top of the main.

The low pressure steam and return piping of the heating system has been so designed as to give the proper circulation of steam under a one pound pressure at the reducing valve. The steam lines for supplying the tempering coils of the ventilating apparatus will be carried individually from the boiler room and will be under separate control.

There will be three electrical generating sets in all. Each of the engines will be protected by a Cochrane vertical type steam separator in the branch type, and the drip connection from these generating sets will be through automatic discharge traps to the high-pressure receiver of the muffler tank. The high-pressure steam distributing header will be eighteen inch internal diameter and its drip outlets at the bottom will discharge into the receiver of the muffler tank in the same manner as those from the engine.

The engineers' designs and specifications for the power plant called for three steam engines of suitable design for direct connection to engine pipe generators. Through the generosity of the Allis-Chalmers Company and the General Electric Company all three of the generating sets will be furnished the club without charge.

In this connection it should be stated that the generosity of manufacturers was not confined to engine and dynamo builders alone, but extended also to the manufacturers of the boilers, elevators and other items of equipment for this building, the boilers being given outright by the Babcock & Wilcox Company and the elevators furnished at cost by the Otis Company.

The working steam pressure at which the boilers will be operated was changed to 125 pounds to accommodate the turbine set.

The two fifty kilowatt units will be given the club by the Allis-Chalmers Company and will each consist of a Corliss type simple horizontal engine direct-connected to a Bullock type generator. The speed at which they will run is 125 revolutions per minute. These units will be identical except that one will be right-hand and the other left-hand.

The seventy-five kilowatt unit will be donated by the General Electric Company, and will consist of a Curtis steam turbine designed to opreate non-condensing, and to run at a speed of 2,400 revolutions per minute. The generator will be directly connected to the extension of the shaft of the turbine, the complete unit being assembled on one cast-iron base and set horizontally.

All three of the generators will be compound-wound for 245 volts at full load current, and they will furnish current to a mixed motor and lighting load throughout the building. Two rotary balancing sets each consisting of two compound-wound, 120-voltst, direct-current generators, mounted upon a common base and direct-coupled, will be installed in the engine room. Each of the machines in these two sets will have a full load current-carrying capacity of forty amperes.

These balancing sets will be used to furnish current to the neutral of the three-wire lighting system. The balanced portion of the current will be taken care of by the main generators directly, and one or both of the balancers will furnish any excess of current which may be required by either side of the system, and thus maintain the neutral wire at a potential midway between the outside wires. Each balancer set will be provided with a back-connected rheostat which will be mounted on the switchboard and the starter for each set will be mounted on a small independent panel placed near the balancer. The main switchboard will be set in an opening in the engine room wall, thus saving considerable valuable space in this room. The front will face the engines and the rear, which will be protected by fireproof doors, will be accessible from the sub-basement passage. This switchboard will consist of seven white marble one-fourth inch bevel sided panels, each seventy-two inches high and one one-half inch thick. The panels will be as follows: three generators, one total output, one equalizer, one lighting feeder and one power feeder panel. A substantial angle iron frame will support these seven panels and the front of the board will be finished at the top and bottom with a white marble moulding four inches deep. At the bottom under the mouiding will be a sub-base of marble slabs eight inches in width, finished to match the board.

The equalizer panel will be equipped with two overload alarms, one being for each balancer. These alarms will consist of a single-pole circuit breaker of the overload type with the current opening switch omitted. The spring plunger, which ordinarily serves to open the breaker when the latch is liberated by the action of the plunger in the solenoid, is to be extended back through the end of the spring chamber, and will be equipped with an insulated metal ring. Two spring clips with binding posts for bell wire will be secured in such manner that when the arm of the overload alarm is liberated by an overload the spring plunger will fly out and the metal ring will make contact with each side of the clips and thus instead of cutting the balancer out of circuit an alarm will be given and the attendant will then adjust the load properly, the balancer being designed to carry such overload as it might be subjected to for the period required for rectifying the excessive unbalance.

The power panel will have nine two-pole feeder switches and also three 200-amperes, single pole, double throw-switches. The function of these latter switches is to connect the three banks of feeders immediately below each either to the power or the lighting bus-bars at will. This is accomplished by having one side of all the power feeder switches connected with the common negative bus-bars and

the other side with the middle point or hinge of the respective double-pole switches. The outer clips of these switches are connected to the power and light positive bus-bars, respectively. The construction of these double throw switches is such that the circuit is not opened in throwing from one set of bus-bars to the other. Thus the three banks of power feeder switches may be fed from the independent power buss when two or more generators are running, or from the lighting used during the hours of the day when it would not pay to run more than one machine.

The conduit system for the conveyance of the feeders and circuits to their respective outlets have been most carefully planned with a view to simplicity and convenience, due care being taken to avoid as far as possibe the crossing of pipes or ducts. All conduit will be concealed in the walls, floors or ceilings. A panel box will be installed on each floor from which the conduits for the branch lighting circuits will be run to the various outlets.

The power feeders have been treated as an independent system from those for the lighting service. Conduit for these feeders will be run direct to the various outlets to be provided near the respective motors which will transmit the power to the elevator machines, sidewalk hoist, freight elevator, blower and exhaust fans, the dish-washing machine, silver buffing lathe, etc.

Current for the various motors throughout the building will be distributed at 240 volts by means of two feeders run directly from the various feeder switches on the power feeder panel. Seven of these feeders will be run, one each to the sidewalk hoist, and the three elevator motors, one to the fan motors located in the sub-basement, one to the fan motors located on the roof and one to the motors driving the dumb waiter, buffing lathe, dish-washer and several machines in use in the laundry.

Separate lighting feeders will be run from the feeder switches on the lighting feeder panel to each floor of the building and to the roof and connected to distribution panelboards. These feeders will each consist of three wires and the current will be fed on the 120-240-volt, three-wire system.

The panelboards will each be of marbelized slate having three polished copper bus-bars running vertically up the center of the panel and two-pole branch circuit switches arranged symmetrically on each side. The feed connection will be made solid without switch or fuses. From the panelboards two-wire branch circuits will run to the various lighting fixtures throughout the building.

The lighting of the sub basement will be accomplished by a combination of incandescent lamps with Cooper Hewitt mercury vapor lamps, each of the latter giving 300 candle power when two are connected in series across a potential of 120 volts.

The call bell system throughout the building will be supplied with current by a motor-generator capable of supplying seven one-half amperes at eight volts, and by an auxiliary primary battery to be used when it becomes desirable to shut down the motor-generator for any reason.

The system will consist of seven distinct divisions or subsystems, namely three annunciator call systems with annunciators in the office, bar and kitchen, respectively; an elevator call system; a door bell system, a fire alarm system and an overload alarm system for the rotary balancers in the engine room. These will be supplied from a panelboard in the engine room by means of separate feed wires. All wires used in connection with the bell systems will be rubber-covered and will be run in metal conduit. Branch circuit boards will be installed on a number of the floors in cabinets from which the wires will run to the individual push buttons placed at convenient locations throughout the building.

A complete conduit system for the accommodation of the telephone wires will be installed. The telephone instruments and wires will be furnished and installed by the New York Telephone Company.

The architects for the building are Messrs. Whitfield & King, whose designs were selected as a result of public competition, and who under the advice of the club's building committee have had much to do with the selection and arrangement of the various equipments, as well as the actual design of the building itself. Putnam A. Bates is the consulting engineer and has charge of all of the electrical machinery and equipments throughout.

CONCRETE FLOOR TEST.

One of the most conclusive tests by fire, loading, and water of reinforced concrete, says the "Scientific American," was that made last year by the Bureau of Buildings, of New York City, of a reinforced concrete floor carried on two reinforced concrete girders, supported by four columns. The purpose of the test was to determine the effect of a continuous fire below the floor of four hours, at an average temperature of 1,700 degrees F,, the floor carrying a load of 150 pounds per square foot. At the end of four hours, the red hot floor was to be subjected to a stream of cold water for five minutes, and then the upper side of the floor was to be flooded at low pressure. As the result of the test there was some flaking of the surface of the concrete, which did no material damage to the building. A stream of water knocked off the concrete from the bottom at one of the girders at the center, exposing the metal rods for a few feet, and there were some slight cracks of no material significance. With the exception of these defects, the whole floor system, in spite of the severe ordeal through which it passed, was found to be in excellent condition. The test was carried out under Prof. Ira H. Woolson, of Columbia University, and on the satisfactory results achieved the system received the approval of the Bureau of Buildings of the City of New York, for whom the test was made. But the most severe test, the one which is generally accepted by engineers and architects as proving on a large scale the fire-resisting qualities of reinforced concrete, was the fierce fire which burnt out the mill of the Pacific Coast Borax Company at Bayonne, N. J., on the night of April 6, 1902. The building, which measured 200 feet by 250 feet, was four stories high in the main portion, and the remainder consisted of a single-story wing. The fire which started from a bursting of an oil main and was fed by a large amount of inflammable material, was an exceedingly hot one; as was proved by the amount of fused cast iron from the machinery and copper from the dynamos and motors, which was found on the various concrete floors (themselves intact) after the conflagration. Everything that the building contained was completely burnt up, and nothing but the monolithic concrete structure remained. This was found to be in absolutely perfect condition, so much so that the building was put in first class shape at a cost of less than one thousand dollars. Evidence of the ability of such a structure to pass through a severe fire test, and yet maintain its integrity, was found in the fact that although the heat must have exceeded 2000 degrees, the side walls, four stories high and 200 feet long, without any cross walls to tie them, were found, at the conclusion of the fire, to be absolutely in line, both vertically and horizontally.

Portland, Or.—By its action in sending to the executive board the franchise application of the Portland General Electric Company for a steam-heating system the street committee of the Council practically recommended the passage of the ordinance, minus the important question of compensation to the city, which must be fixed by the executive board. The company wants the right to lay pipes and collect tolls for heating throughout the business portion of the city. The rate to be charged the consumers of this steamheat is 75 cents for enough steam to condense into 1000 pounds of water. The committee met in special session, read the application for a franchise and found no objections.

Industrial.

TO OUR SUBSCRIBERS.

Like all large families, The Journal's family of subcribers is scattered far and wide. There is not a States in the Union where its subscribers are not found in large numbers and these are also scattered through Canada, Alaska, Central America, South America and our Island possessions. Its subscripion list in foreign countries, if given in detail, would read like a gazetteer, for it includes Japan, China, India, Russia, Norway, Sweden, Italy, Germany, Switzerland, Holland, England, Australia, New Zealand and Africa.

The "outside public" are, of course, most welcome and will always find much to interest them in The Journal. There is, however, an "inner circle" within a defined territory, to which The Journal especially appeals and for whose particular benefit and interests it is published. This territory may be described as that large section lying West of the Mississippi, in which The Journal occupies the proud position of being the only publication devoted to electrical, gas, power and railway interests. It has devoted itself to these important lines for the past sixteen years and its steady growth in circulation and influence is a tangible evidence that it has succeeded in winning the confidence and appreciation of the members of both the professions and the trades represented.

Its location in San Francisco gave it a logical center, from which it could, through its Main and Branch offices, keep in close touch with the Pacific Northwest, the Mountain Country and the Pacific Southwest. The interest of all of these sections as well as those of Central California, were considered equally important and The Journal has endeavored in its descriptive and news matter to record the developments of the allied interests—whether it was a new electric power plant, a telephone line, an electric railroad or a projected water-works. These descriptions have become the historical accounts, from a technical point of view, of these enterprises and a file of The Journal affords to-day the only thorough and exhaustive record of the marvelous development in these lines which mark the progress of this Far Western country.

The recent fire which visited San Francisco not only destroyed The Journal's office and printing plant, but was so far reaching in its results that it became a matter of great and universal interest in professional and trade circles. The rebuilding of San Francisco affects all branches of trade throughout the world and The Journal feels that it is expected to chronicle the progress of this construction for the benefit of its entire constituency.

Now, however, that its mechanical facilities are improved and The Journal is rapidly assuming its old time size—the only difference being that it will appear weekly instead of monthly—it will, as heretofore, cover with impartial thoroughness every section which it represents, so that its good friends in Seattle, Tacoma, Portland, Spokane, Butte, Helena, Tonopah, Salt Lake City, Denver, Los Angeles, San Diego and other cities will find the old time attention to electrical interests in each of their own localities. At the same time The Journal will continue to deal fully with the many important happenings in San Francisco, where an opportunity exists never before equalled in the world's history for both professional and trade accomplishments.

Important additions to The Journal's Editorial Staff—a new Journal of Electricity Building—a large and modern Printing Plant—an up-to-date Art Bureau—many important improvements in the literary and departmental features of The Journal—all these are subjects which the Journal will recount more fully to its readers in subsequent issues. Just now, it will only mention that The Journal stands at the threshold of the most important era of its history, and what it has accomplished before is but an earnest of the greater plans which it has made for the future.

THE CENTURY-KLEIN CO. INC.

This company reports a fine business. Three carloads of goods has just arrived and these are being distributed.

Their new location in San Francisco will be at the corner of New Montgomery and Minna streets, to which they will remove about September 1st. This is one of the choicest locations in the city and they are to be congratulated upon their good fortune in securing same

H. W JOHNS-MANVILLE CO.

This concern is as comfortable and well equipped for business in their new building at 180 and 182 Second street, San Francisco as though they had been located there for years. They have abandoned the sale of Old Code goods and now supply exclusively their new Code line. They have recently introduced an improvement in their "Noark" fuse plug, which is fully described in their advertisement. The new feature is the making and pressing out of one piece of brass both the thread and the inside brass case, thus preventing the solder from melting if fuse is overheated.

HUNT, MIRK & COMPANYS' NEW LOCATION

A steel skeleton five-story structure with metal doors and sashes will be erected on the east side of Second street, between Mission and Natoma streets, San Francisco, 50x80 feet, is to be permanently improved by its owners, John G. Barker, Calvin E. Knickerbocker and H. R. Bostwick. The building will be a five-story structure of A class, having a steel skeleton and reinforced concrete sashes, little or no wood being employed in the construction. It has been planned by John Cotter Pelton in the most substantial manner, it being designed to carry the highest warehouse load of 50 pounds to the square foot.

The building will be for store and commercial purposes. The first floor has been leased to Hunt, Mirk & Co.

MEESE AND GOTTFRIED COMPANY.

This concern is increasing their manufacturing department by adding two large buildings to their factory at Nineteenth and Harrison streets, which, by the way, was not injured by the fire. They are running day and night to supply the demands for their special types of power transmitting, elevating and conveying machinery.

They have just secured a contract for the erection of a plant for the Pacific Portland Cement Company, Cement, California, which will be one of the largest of its kind in the United States.

They have also contracts for several large plants for various purposes in San Francisco, work on which will be begun as soon as insurance details are adjusted.

Home and Foreign News.

TRANSFORMING IRON ORE INTO STEEL BY ELECTRICITY AT THE JAMESTOWN EXPOSITION.

While the Jamestown Exposition, to be held near Norfolk, Va., next year will be primarily a great international military and naval display and a historical exposition it will also have many exhibitions of practical industrial and commercial processes and will bring to light much of public benefit. Dr. David T. Day a mining expert who has been connected with every exposition in which the United States has made a mineral exhibit for the past decade is arranging for an interesting and useful exhibit at the Jamestown Exposition. It will be made by Uncle Sam under directions of Dr. Day for the public good. Iron ore which is so extensively found in the States near the Exposition is to be smelted by electricity in an open arena where the crowds can witness it and see the progress which has been made in the way of handling ores during the past few years. Smelters will be operated by electricity in plain view of the public and iron ore will be transformed into hardened steel by the most improved processes.

MULTIPLE UNIT CONTROL FOR STREET RAILWAY.

A system of multiple unit control is now being installed on two of the big cars of the Pacific Electric Company, and if it proves successful orders will be given immediately for the like equipping of fifty cars of the suburban lines.

The ability to run the cars of the system singly as at present or in long trains to take care of big crowds on holidays or special occasions is the almost incalculable benefit to be derived from the proposed installation of multiple unit.

One of the most attractive features of the new system in the eyes of the operating department is its great simplicity, and the fact that at a moment's notice a whole train may be broken up into its component units of individual motor cars and each run singly. Instead of a long train made up of a motor pulling a string of trailers, every train would be combination of working units, every one working up to its full capacity and maximum efficiency, and all under control of one man when running coupled.

MAXIMUM VOLTAGE FOR UNDERGROUND CABLES

The Bulletin de la Societe Internationale des Electriciens for April contains an account of experiments made by Mr. de Marchena upon underground cables to determine the practical limit of pressures which may be safely employed. Two installations formed the subject of his experiments, the first being a high tension tramway system at Nice, and the second a transmission line to convey power to Nice from a hydraulic installation, both of which have been in operation for a few years. From the successful results attained elsewhere at a pressure of 5,500 volts, it was decided to try 11,000 volts on these lines. The cables employed were three-core, with eight millimeters of insulation between conductors, and eight millemeters between connuctors and lead covering, also insulation of 10 millimeters between conductors was tried. The first experiments, made in 1902, were unsuccessful, and extensions were made with cables tested before shipment to 40,000 volts and with a minimum insulation of 10 millimeters. There are now 45 kiolmeters of cable giving satisfaction at 11,000 volts. The conclusions of the author are that cables carrying pressures up to 20,000 or 22,000 volts can be successfully made and maintained underground, but that from 20,000 to 40,000 volts they are liable to give trouble, and above 40,000 volts are considered to be impracticable for operation.

A MODEL INDUSTRIAL TOWN

Within a short time the United States Steel corporation will issue $50,000,000 bonds, the proceeds to be used in building a steel plant at the new city of Gary, Indiana.

The town is to be built on the lines of the most advanced and scientific ideas of municipal reform. It will contain, besides model workmen's dwellings, public baths, laundries, kitchens and other municipal enterprises, and will have a theatre and a large assembly hall for meetings of every description.

The new plant will require 10 years for its building. There will be twenty-seven blast furnaces and fifty open-hearth furnaces, making it the largest steel plant in the world. More than 12,000 men will be employed in the plant.

A BIG ELECTRIC SIGN.

Incandescent advertising is being used at the top of a building at the corner of Coventry street and Leicester Square, London this faces Piccadilly Circus with its night crowds and is said to be one of the most populous after-dark thoroughfares in the world. An electric sign with changing letters 100 feet long and four feet high will be erected, and contracts taken for flashing advertising phrases, each appearing about eight times an hour from dusk to midnight. The projectors believe that this is the largest electric advertisment in the world. Its 850 lamps, however, fall short of the number in the huge Butterick sign in New York, which has 1,134 with letters fifty feet high.

KINGS RIVER POWER.

The King River Power Company is planning to expend upwards of $8,000,000 in developing the large water power possibilities on the Kings River, near Fresno, Cal. The company is composed of capitalists interested in the Edison Electric Company and the Pacific Light and Power Company of Los Angeles.

The power developed in the Kings River Valley will be entirely used in central California. Four power plants, each to cost $2,000,000 are to be located on the Kings River. The first will be on the river between Trimmers and Maxon's, to which point the county road already reaches. The second will be at the junction of Mill Creek with the river; the third will be at the junction of the middle and south forks of the river, and the fourth at the junction of Boulder Creek with the south fork of the river. The latter point is the final point of the Ellery survey for the State highway.

These power plants are to be constructed in the order named, during several years to come. Work will begin this summer on the one above Trimmer. About four miles from Maxon's the company is to build a $20,000 bridge to cross over to the south and east side. From this bridge to the fork of the river is a distance of thirty miles, and the company expects to have a roadway for the entire distance within the next year. Already the first twelve miles are done, and a force of forty men will be put on immediately to push the work on the rest of the way at a cost of $2,000 a mile. Work on the bridge will begin as soon as the supervisors let the contract for the county's share of the improvements.

The total capacity of the company's four power plants will be close to 150,000 horsepower, of which the first one will furnish 40,000 horsepower. Chief Engineer F. C. Finkle, of the Edison Electric Company, states that all the power will be used in the San Joaquin Valley development, probably a large portion being used for electric railways that will eventually traverse the valley.

Portland, Or.—Initial steps in a $1,000,000 irrigation and power project of Cook county have been taken by the filing at Prineville of a notice of appropriation of the waters of the Deschutes river by F. H. Goudy of the firm of Forbes & Goudy.

ELECTRIFIED BARBER SHOPS

Tonsorialism has expressed itself, says "Electricity," at this late date in the guise of a new art. The dingy barber shop no longer appeals to the fastidious minded. It must be, what the age requires—up to date—in order to fall in line with modern things, and represent modern progress. For such reasons as these, the barber of advanced ideas equips his shop in a different manner from his predecessor. There are new demands made upon his ingenuity and skill. The barber shop, as found to-day, is so different from what it was of old that to merely enumerate the new list of requirements will prove a source of deep surprise. Shaving, face massage, shampooing, hair singeing and hot towels are the basis of these improvements, and have become so necessary that, as one barber puts it, to be without them is to loose trade of the most desirable kind. Up to date barber shops are therefore equipped in the following manner, as far as application of electricity is concerned. They are provided with electric signs in some instances over the door as an advertisement, with electric razor sterilizers, electric hot water urns, electric cups, electric singeing and massaging devices and in some shops attached to each chair. It seems when examining the list of electrical applications made, that it enters into every department of the barber's art, including even stropping, if so desired. It might be said that the only thing to-day, in a modernized and electrically equipped barber shop, is the razor used. There is every indication at present that even the steel of which this is made, according to reports from Salt St. Marie, Canada, will be manufactured direct from the ore in the electric furnace. With the apparatus rendered electrically antiseptic, the towels electrically sterilized, massage applied by electric power, the hair electrically singed, the air cooled and changed by electric ventilation, and the place illuminated inside and advertised outside by electricity, it may well said that the newest barber shops have been completely electrified.

OFFICIAL INAUGURATION OF THE SIMPLON TUNNEL

The official inauguration of the Simplon tunnel by the King of Italy took place May 19th at Brieg, Switzerland. The Royal train consisted of seven coaches, drawn by two powerful steam locomotives, the electric traction installation not being completed. As King Victor Emmanuel alighted, the President of the Swiss Confederation advanced and shook hands with his Majesty, and, after the usual exchange of greetings and introductions, the King and the Swiss President, followed by their suites, inspected the guard of honor. His Majesty was wearing the undress uniform of a general of infantry, without decorations.

At ten minutes past one the President of the Confederation, speaking in German, proposed the health of King Victor Emmanuel. The President said he was happy to have an opportunity of greeting the King of Italy on Swiss territory. He congratulated all concerned on the completion of the Simplon Tunnel, and expressed the hope that the new means of communication would serve to increase the commerical intercourse between the two countries and to draw closer their friendship.

King Victor Emmanuel, replying in Italian, thanked the Federal Council for their kind welcome, and for the reception accorded to him. His Majesty said he was happy to be able to express, on Swiss soil, and on so solemn an occasion, all the sympathy he felt for the industrious Swiss people. He rejoiced at the new material tie which had just been added to the numerous ties already uniting the two countries, and which would render the cordial friendship of Switzerland and Italy indestructible. He paid a grateful tribute to the men who had conceived the idea of this imperishable work, and to those who had put it into execution.

ELECTRICAL AND MACHINERY EQUIPMENT OF THE NEW HAMBURG-AMERICAN LINE.

The Hamburg-American line's new steamship, Kaiserin Auguste Victoria, arrived in New York on Saturday, May 19th. This is said to be the largest steamship ever built, and was constructed at the yards of the Vulcan Ship building Company, Stettin, Gemany.

All the living rooms, says the "Electrical Review," as well as the engine and boiler rooms and the provision and store rooms, are electrically lighted with over 4,000 incandescent lamps. Current is generated by six dynamos, five of which are in the engine room and one above the water line between the boiler and the engine room In addition to the lighting equipment there is a bell-signal system for all the saloons and the rooms of the first and second cabins, the rooms of the ship's officers and the pantry. There are electric cigar lighters in the smoking rooms of the first and second cabins and in the restaurant. There are electric curling irons in the first and second cabin staterooms.

There is an alarm bell-signal system for the ship and enignes, bell signal system for fire-extinguishing purposes and a fire-alarm system with annunciators on every deck.

All apartments and staterooms are electrically heated. In the kitchen there are installed electrically operated plate washers, knife cleaners, silver cleaning machines, egg boilers, coffee and tea machines and water filters.

A Marconi wireless-telegraph station is installed near the first-cabin smoking room on the deck, where telegrams are received and sent and news is to be received for two daily newspapers, which are printed on board, one in German and the other in English.

The ship is driven by two four bladed magnese bronze screws twenty-two feet in diameter. These are connected, by means of propeller shafts 217 feet long and 19.3 inches in diameter, with the two main engines, which have a normal speed of about eighty-four revolutions per minute and are of about 17,200 horsepower. The main engines are four-cylinder, quadruple-expansion, and are balanced to prevent vibration. Each main engine has a surface condenser of 11,160 feet of cooling surface for condensing the exhaust.

There is a loud-speaking telephone connecting the bridge with both engine rooms, the engineer's office, the telephone house aft, the crow's nest, the lower bridge, the wheel house and the stren. The ordinary telephone system connects all the passenger staterooms of the first cabin, as well as the saloons. There are six telephone central stations for the first cabin and one telephone central station for the second cabin.

The boiler plant consists of eight double-ended and one single-ended cylinderical boilers with fifty-one furnaces in all. The former operate with forced draught while the single-ended boiler operates with natural draught and serves as an auxiliary boiler while in harbor. The steam pressure is 225 pounds. The forced draught is provided by two fan blowers, each having a diameter of eleven feet and being driven by a 100-horsepower steam engine supplying 1,130 cubic feet of air to the furnace grates. The necessary feed water is supplied to the boilers by three twin steam pumps on the Weir system, which are placed in the engine room and force the water through two filters to the feed-water heater in the boiler or direct into the boiler.

In order to make up for wasted feed water there are two evaporators, each of which has a capacity of twenty-five tons of fresh water per twenty-four hours

The ventilation of the different boiler and engine rooms is effected by four fan ventilators, each of which is driven by a steam engine and is installed above the boiler room, supplying air through ducts. The ventilation of the engine room is also effected by means of ventilating pipes leading down from the deck.

News Notes.

San Diego, Cal.—Announcement is made by J. O. Stillman of the American De Forest Wireless Telegraph that the parent company has sold its entire Pacific Coast plant to a subsidiary company known as the Oriental and Occidental De Forest Wireless Telegraph Company, and the new organization, which is incorporated in Maine, is to take charge. Headquarters will be in San Francisco. Orders are already out for the establishment of new stations at Sacramento, Eureka, Santa Barbara, Stockton and Fresno.

Pittsburg, Pa—Activity in all lines of business and manufacturing is maintained in the Pittsburg district. The iron and steel companies are deluged with orders, this being especially true with the rail mills. Orders are already being placed for 1907 delivery. Already orders for more than 1,000,000 tons have been booked and inquiries amount to 5,000,000 tons.

Kalmath Falls, Or.—The first rails for the electric street railway have been laid by the Hot Springs Development Company. A large crew of men is still working day and night.

San Francisco, Cal —The San Francisco Bay Improvement Company have just ordered a three thousand ton rock crushing plant, complete, of the Allis-Chalmers Company, San Francisco.

Aberdeen, Wash.—W. J. Patterson, A. J. West and A. F. Coates of this city, with C. H. Clemmons and George W. Ninemire of Montesano, will apply for articles of incorporation for the Grays Harbor and Puget Sound Railway Company. Headquarters will be in this city, and the capital stock is placed at $10,000. By the terms of the articles the company will be authorized to build and equip a steam, electric or any other kind of railroad, and to mine for minerals of any kind. They may also supply electricity.

Oregon City, Or.—Baling wire thrown across the high tension feed cables of the Portland General Electric Co. in Albina by mischievous boys, short-circuited the current, burned out a "pothead" at the North Portland steam plant, started a fire in the power station at Oregon City, throwing Portland and all its suburbs and Oregon City into utter darkness, tying up all street car traffic and putting everything out of commission that was dependent upon electric current for motive power. As soon as the cause of the trouble was learned the local steam plant was put in operation and the car lines and incandescent circuits were switched on to it. The damage to the power plant is estimated at about $2000.

Portland, Or.—The Fobes Supply Company which will deal in all kinds of electrical machinery and supplies, has been organized with a capital of $50,000. This is an off shoot of the company of same name in Seattle, who recently purchased the Northwestern Engineering Company of Portland.

Whitefish, Montana—The town of Whitefish will expend $30,000 in installing a new water system.

Hailey, Idao—Bids are asked until July 1st by Leo Cramer for the construction of water works to cost between $25,000 and $30,000.

Spokane, Wash.—Plans are being perfected for an independent telephone service throughout the Inland Empire. Connections will soon be made between the Nez Perce Co-Operative Company and the Interstate Co-Operative Company and long distance trunk lines will be constructed by the Automatic Independent Company. The company will spend $1,000,000 in construction work.

Tocoma, Wash.—The largest electric power plant in the Western States will be built near Buckley, in this county, at a cost of four million dollars. Work has been started by Stone & Webster of Boston, who control the street railways of Tacoma and Seattle and the Tocoma Seattle Interurban road. The plant will develop 50,000 horsepower and two years will be required for its construction.

The project was originally undertaken by the White River Power Company, under the management of Charles H. Baker, a noted engineer of Chicago and Tacoma. His plan was blocked when Stone & Webster acquired the water rights on White river and by injunction prevented Baker from interfering with their rights.

An immense dam is being built across White river two miles from Buckley, and water will be taken thence to the power-house, five miles away, through a canal fifty feet wide. The complete plant will be more than double the size of the plant at Electron, owned by the same company. The additional power will be used by Stone & Webster's present electric systems and new lines to be built.

Boise, Idaho—E. H. McCauley has purchased the Emmett Power and Water Company's plant at Emmett and will make changes and improvements in the plant. The methods of operations will be changed from steam to water power.

Red Lodge, Montana—A company has been incorporated known as the Bear Creek Water Company; capital $60,000, which will supply water and electric light to the immediate vicinity.

Shoshone Falls, Idaho—It is reported that the General Electric Company expects to secure control of all the power plants and sites along the Snake river and supply power to Salt Lake and other Utah points.

Portland, Or.—Portland's next great traction improvement will be the construction of a subway, or tunnel, under the Willamette River, to carry passenger and freight traffic by electric power. Plans are rapidly maturing for the subway and for a street car system to cover East Portland, with cross street lines and three main lines to the east and north city limits, tapping the packing house district on the peninsula. The total cost will be about $2,000,000. Work on the subway will probably begin this summer. About two months ago the undertaking was begun by Thomas McCusker of the the Geiser-Hendryx Investment Company, and L. Y. Keady, one of the original promoters of the Oregon Traction Company's Portland-Forest Grove Interurban railway, now being carried forward by the United Railways company. The subway and east side trolley system has been taken up as a distinctly independent project and has secured the support of ample capital. The grade will be 3½ per cent. It will consist of a double tube twenty feet in height. Each tube will carry standard gauge and narrow gauge track. The tubes will be of steel reinforced with concrete inside. The opening at each end will be above any possibilities of interference by high water. The franchise provides that the subway shall be commenced within a year and completed within five years. It is estimated that before the expiration of the time limit for its completion the growth of the city will have brought about double the present congestion of streetcar traffic on the bridges and the subway will prove to be of great importance in solving the drawbridge problem in Portland.

Portland, Or.—Within a few days construction of two interurban rilroads between Portland and Salem will be under way with all the energy of two strong companies, well equipped and directed by men thoroughly experienced in electric railway construction. The roads will follow different routes, entirely independent of each other and relying upon local business developed. They will tap districts ranking among the richest sections in Oregon.

Astoria, Or.—The Astoria Electric Company is installing a 500 kilowatt, General Electric three-phase, sixty-cycle generator, direct connected to a 20x40x30 McIntosh and Seymour vertical cross compound engine and a 300 kilowatt general electric synchronous motor generator set.

Baker City, Or.—The Standard gauge electric road which is being built from the Grand Ronde valley to the Indiana mines and Medical Springs will likely be extended to Baker City, as Chief Engineer Cook and a party of eleven surveyors have run the grade to the summit about six miles above the resort.

Milton, Or.—During the recent big flood which swept over Umatilla county, the Northwestern Gas and Electric plant on the Walla Walla River, which supplies light for Walla Walla and Pendleton, was so badly demolished that it will be at least ten days before these towns and many of the intervening points can be furnished with lights. All are using old-fashioned coal oil lamps. Four of the six big transformers were swept from their concrete foundations and one was found 150 yards from its station. As these transformers weigh six tons each, the water must have had terrible force. About 1200 feet of the flume was washed away.

Portland, Or.—Power wires carrying 60,000 volts each will be leading electricity to the city from the works of the Mount Hood Electric Company on the Sandy River by next Fall. The poles carrying these well-loaded wires will be set along the Base Line and Section Line roads to the central offices of the company, one of which will be located on each side of the Willamette River. "These 60,000-volt wires will be no more dangerous than the 6000-volt cables now strung along certain streets of Portland," said Manager C. W. Miller, of the company. "The Mount Hood Electric Company will expend in all about $2,000,000 in our plants and systems by the time we get ready to furnish light, heat and power to the people of Portland. We have developed 80,000-horsepower with our three plants on Sandy River. With the entire falls of the Willamette at Oregon City the General Electric can only generate 8000. Our advantage lies in having a 900-foot head against an 18-foot head at Oregon City. The insulators for these high-voltage wires are of porcelain and weigh twenty pounds each. They are placed on the tops of the poles like so many terracotta hats and will prove of unique appearance when in position. The ordinary glass insulator would be of no avail with these 60,000-volt wires."

Portland, Or.—The Oregon Water Power Company will spend $500,000 in construction work this season, said Manager F. 1. Fuller, in the development of its water power on the line between Portand and its eastern terminus, in Clackamas County.

Sumas, Wash.—The Columbia Improvement Company is putting together another pipe line at its Nooksack Falls power plant, that will increase it to about 3300 horsepower, or double that of the present pipe line.

Walla Walla, Wash.—President L. W. Anderson of the Walla Walla Valley Traction Company announced that all the equipment including cars, rails, ties and other material necessary to the construction of the interurban line between Walla Walla and Freewater, had been ordered for September delivery.

Ontario, Or.—The Ontario Light and Water Company has a large force of men at work putting in their pipe line. The system will be completed by July 15.

Lewiston, Montana—A deal has been consumated whereby the Bell Telephone Company has taken over the stock of the Lewiston Telephone Company and assume all indebtedness.

San Francisco, Cal.—San Francisco proposes to go into the business of building homes for the destitute. Mayor Schmitz intimated so much in an interview in which he outlined a plan for investing $3,000,000 in houses and lots for the needy of the city. The scheme is in a way a proposal to enter into the building and loan business, it being the design to have the purchasers repay in the form of rents and nominal rate of interest on the outlay of the city.

Clarkston, Wash.—The Lewiston-Clarkston Company will soon shut down for repairs to its steam power plant. The company is also increasing its electric power capacity from 1500 to 3000 horsepower. The present 500 horsepower plant at Asotin will be replaced by 2,100 horsepower.

Pasco, Wash.—Construction work preparatory to the installation of city electric light and water plants for the town will be commenced about July 1st.

Waverly, Wash.,—A franchise was granted to F. H. Morrison for an electric light and power system for the town.

Washington, D. C.—The House Commitee on Public Buildings and grounds inserted in the omnibus building Bill an item of $375,000 for the rebuilding of the Sub-Treasury of San Francisco. Additional ground for the site is to be purchased with $75,000 of the amount and the balance will be used for the building.

Los Angeles, Cal.—It is said that H. E. Huntington will take up a number of plans for extensions of his railway systems and in real estate improvements. It is Mr. Huntington's intention to build a palatial home for himself on the San Marino ranch. He has had a private switch built from the Monrovia Railway to this home site, which will be occupied by his private car during his stay here.

San Francisco, Cal.—William Muir, who made a similar application once before, has filed a paper with Recorder Nelson, which is a notice of application for the right to tunnel under the bay of San Francisco for mining, domestic and transportation purposes, which he claims by right of location. His scheme includes a tunnel which is to extend under the bay of San Francisco and across to Alameda. The projected tunnel is to begin at a point at the Alameda pier, 144 feet below low-water mark; to run 10,500 feet to the deepest part of the bay and 105 feet below its bottom, and then to the west shore of San Francisco bay, terminating at Townsend and Second streets, with branches to distributing points level with the railroads, at which the branches are to terminate. The tunnel is to have a double track, standard guage, upon which cars are to be operated by electric power. The upper half of the tunnel is to be equipped with roadways for teams, automobiles, bicyclists and pedestrians. The roadway is to terminate on Brannen Street, upon a level with that street. The tunnel is also to carry water for domestic purposes.

Long Beach, Cal.—W. L. Porterfield of this city, president of the Long Beach Home Telephone Company and principal owner of the exchanges of San Pedro, Santa Ana, San Bernardino, Ventura, Upland, Highland, Fullerton, Ontario, Corona and Colton, has sold all of his holdings to a number of Los Angeles men, headed by J. M. C. Marble. The price was $1,350,000 and includes all of Mr. Porterfield's interest in the plants operating and several franchises owned in other cities of Southern California.

Newberg, Or.—The Newberg Electric Light Company and the Spaulding Logging Company have been consolidated under the name of Yamhill Electric Company. The Company is incorporated with a capital of $25,000 and will build a new plant of 300 horsepower on the Willamette River.

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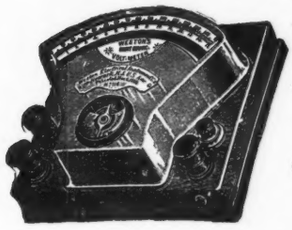

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Colville, Or.—The Colville and Columbia River Transportation Company filed articles of incorporation to build a standard gauge electric railroad from Colville to Myers Falls and from Myers Falls to the old steamboat landing on the Columbia river, nineteen miles. The capital stock is $250,000; trustees, A. Wilkes, W. B. Aris, Ellen C. Gilluly, G. W. Gilluly and H. C. Rice.

Portland, Or.—An extension from the main line of the Oregon Water Power and Railway Company at Gladstone, on the Oregon City division, is being considered.

Seattle, Wash.—Plans have been perfected by the Seattle, Renton and Southern Railroad for the double tracking of every foot of its right of way as quickly as the work can be done.

Livingston, Montana—G. L. Tanzer, N. L. Smith and W. R. Wililams, of Seattle, have filed articles with the clerk of Park county for the incorporation of the New World Electric Railway Company, with a capital of $3,000,000.

Prineville, Or.—Postmaster Summers is building a telephone line to Paulina, a distance of fifty-five miles. Extensions will also be made to the Prineville-Madras line.

Portland, Or.—The Portland Railway Company will spend $350,000 on improvements to its tracks within the city this season.

New Westminster, B. C. —It is reported that the British Columbia Electric railway will build a line from New Westminster to Chilliwack, a distance of ninety miles, to cost $3,000,000.

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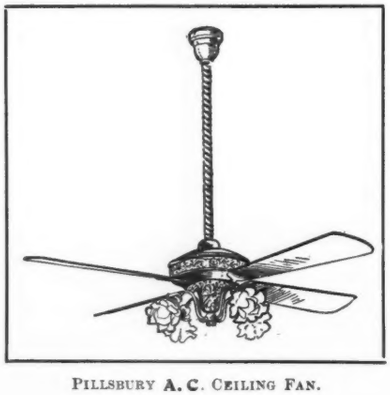

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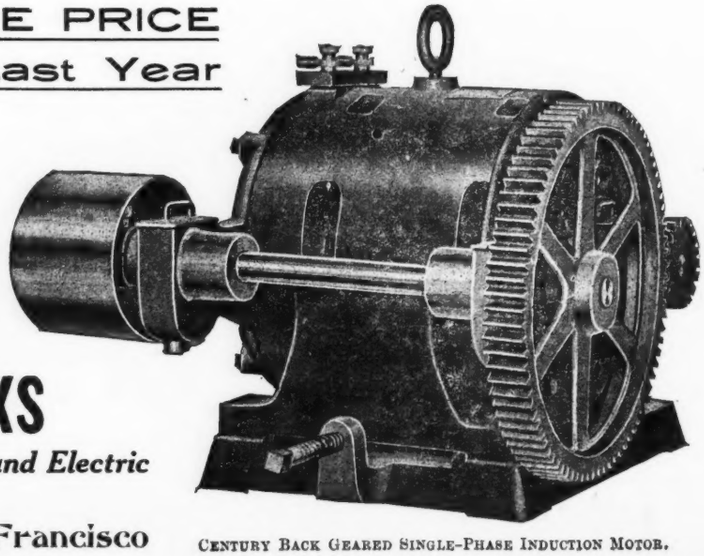

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Edward F. Cannon & Co., electric and hydraulic engineers, 309 McKay Bldg., Portland, Or.

Leon M. Hall, consulting engineer, 814 Hayward Building, San Francisco.

R. S. Masson, consulting engineer, 709 Pacific Electric Building, Los Angeles.

W. Stuart Smith, consulting engineer, 2538 Dwight Way, Berkeley, Cal.

H. C. Thaxter, electrical and mechanical engineer, Atlas Building, 604 Mission Street, San Francisco.

G. F. Wakefield, surveyor and engineer, room 22, Porter Bldg., San Jose, Cal.

Van der Nailen's School of Practical Engineering, Telegraph Ave. and 51st Street, Oakland.

Clem A. Copeland, M. E., consulting and supervising electrical and mechanical engineer, Bradbury Building, Los Angeles, Cal.

Robert McF. Doble, consulting and supervising engineer, San Francisco, Cal., Colorado Springs, Colo.

Mutual Gas and Engineering Company, consulting engineers and builders of gas plants, 202 Union Bank Building, Oakland.

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San Francisco, Cal. — The California Petroleum Refinery has just placed an order with the Stanley G.-I. Electrical Co. for two 300 kilowatts, 180 revolutions per minute, engine type generators; also two 20 kilowatts direct connected exciter engine sets and a five panel switchboard.

Oakland, Cal.—The Contra Costa Water Company has merged with the new Syndicate Water Company.

Bellingham, Wash.—It is reported that the Whatcom County Railway and Light Company will construct an interurban line to Lynden and Ferndale, also to Blaine by way of Marietta.

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